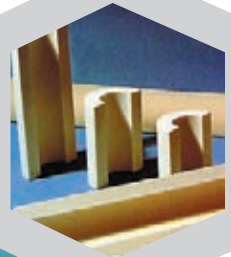
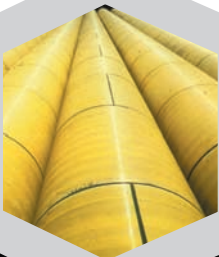


IFS

Chemicals Ltd



Introduction



IFS Chemicals is a formulating company, which provides customised polyurethane chemicals to a wide cross-section of industries including the refrigeration, industrial insulation, automotive, marine and leisure industries. The Company provides chemicals, equipment, and know-how to most types of polyurethane foam and elastomer end-users.

In the case of chemical formulations for new customers, these are provided on a "Sale by Sample" basis, whereby formulations developed by our highly qualified and experienced chemists are submitted for technical approval. Our technical service personnel assist customers in the processing aspects of the chemical systems, after which a specification is formally agreed for subsequent order delivery purposes.



Innovation

As a Company which emphasises innovation, high quality and excellent levels of technical service, IFS works to very strict standards within the ISO 9001 procedure to deliver custom-formulated polyurethanes of the highest possible quality.

*formulating to
meet the specific
requirements
of the customer*

Private Ownership

The fact that IFS is truly independent and privately owned means that raw materials used in the various formulations are chosen because of their technical qualities. This is not always the case with larger multi-national firms where formulating chemists are obliged to make maximum use of in-house base chemicals. Consequently, IFS is able to optimise a formulation to meet the specific requirements of the customer rather than provide a compromise solution.

Cooperation

Whilst not being formally linked with any particular multinational organisation, IFS does believe in the principle of close and open discussion with its major suppliers for their mutual benefit. By understanding each others aims and constraints, a more successful working relationship can be established to the overall benefit of the ultimate customer. The key to a successful operation of this type lies in the support of chemical partners, particularly those who provide IFS with good quality raw materials. The Company has forged excellent relationships with some of the largest raw material manufacturers in the world and is privileged to operate as a conduit to ensure that their raw materials penetrate the UK polyurethane market via ourselves.



IFS has generated an extensive database of polyurethane raw materials to provide maximum flexibility when formulating specialist chemical systems. This includes most European and US products, as well as an increasing number of new products being manufactured in the Far East.

Customised Solutions

The business philosophy of IFS is to provide clients with customised chemical systems at a price that they would normally pay for generic, non-optimised materials from other sources. In addition, IFS provides a level of Technical Assistance that is unrivalled in the industry. As our reputation for quality and service has spread throughout the polyurethane industry, IFS has become prominent in many business areas, some of which are shown over the following pages.

Rolls-Royce sprayed polyurea

Formulated to combine trouble free processing with high mechanical properties, a system was produced to manufacture front and rear bumpers for their range of prestigious cars.



Sub-sea pipeline insulation

A high density foam/elastomer insulation system was developed for a specific type of pipeline laying process. The insulation required high mechanical properties whilst being capable of being applied using a *Controlled Rotational Casting* technique. Since the laying process involved the circular reeling of the pipeline, a relatively high ultimate elongation was required. These conflicting requirements led to a significant development programme and the successful application of this type of sub-sea pipeline, the first of its kind in the world.



Land Rover moulded items

A requirement was highlighted for a polyurethane foam which would be suitable for the manufacture of internal trim items with two specific requirements: low part weight and use of zero ODP blowing agents. A successful development program produced a foam system used in daily production of parts for the Land Rover series of vehicles.



JCB lightweight mouldings

In order to provide a lightweight moulded item for JCB, IFS Chemicals worked closely with BI Composites of Cannock to combine a polyurethane foam with a high impact ABS. This development resulted in a highly successful composite material that provided the mechanical properties sought by JCB and the processing properties required by the manufacturing company, BI Composites.



IFS Chemicals Ltd. has gained an enviable reputation for solving customer requirements by total dedication to development programmes and working closely with existing and prospective customers.

*working closely with existing
and prospective clients*

Foam Products

Automotive

Integral-skin moulding grades for steering wheels, arm rests, gear levers etc.

Structural rigid foams for internal items including GMFU (Glass Mat Filled Urethane) systems for seats, parcel shelves etc.



Semi rigid, energy management foams for facias, back-filling behind PVC slush mouldings etc.



General mouldings

Imitation wood products, picture frames, mirror frames, industrial metal detectors etc.



Marine applications

Buoyancy products for sea vessels and pleasure craft. Includes high density foams for sub-sea, syntactic foams and protective coatings.



Foam Products

Construction

Building panels, blockfoam, spray applied insulation, cavity filling, insulated building blocks, double band lamination, modular building and insulated doors.



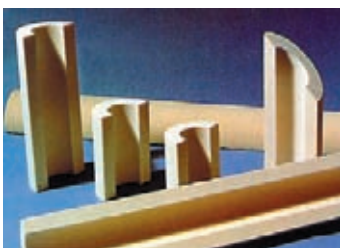
Refrigeration

Cold stores, cold rooms (modular), supermarket display cabinets, commercial and domestic refrigerators, ice-making cabinets, LPG tankers, refrigerated vehicles.



General insulation

High levels of thermal insulation are required in the pipeline industry, whether for above-ground installations or sub-sea applications. IFS has developed many blowing agent packages which ensure ease of processing and high thermal insulation levels. These products are suitable for hot water storage tanks, drinks flasks and oil storage vessels.



Elastomer products

Sports floors

External binders for children's play areas (used with rubber crumb) Internal, high performance flooring systems based on two component polyurethanes.



Casting resins

A large selection of materials for solid, cast products with a hardness range from 20 shore A to 80 shore D.

General and high-performance resins for pipeline protection. Concrete moulding, pipeline joints, table edging, electrical encapsulation.



Tyre filling

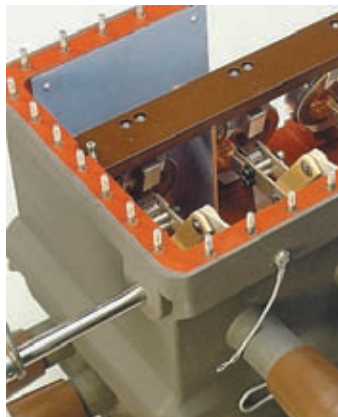
Speciality resins for industrial tyres.

Automotive

Sound deadening mats (filled resins).

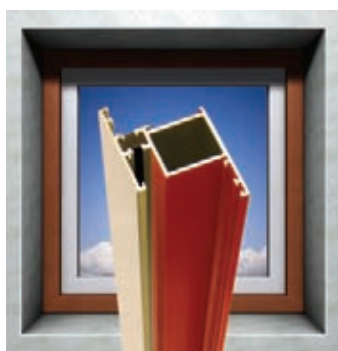
Polyurea RIM

Spray-applied products for high performance elastomers (eg Rolls-Royce bumpers).



High modulus elastomers

Thermal-break resins for the double-glazing industry and two-part resins for general, high impact applications. Many products can be used as alternatives to polyester casting resins, with the benefit of customised gel and cure times.



High Performance Elastomers

IFS Chemicals has a wide range of high performance elastomer systems utilising chemistry based on polyether glycols, polyesters, PTMEGs and polyureas. Most react with MDI prepolymers but some grades use TDI prepolymers or aliphatic isocyanates.

The *Megathane* series of products are based on PTMEG (polytetramethylene ether glycol) in a hardness range from 65A to 95A. These products are available from IFS either as specific two-part systems or as a three-component system with the facility to alter the final hardness over the range quoted above.

The *Esterthane* series is again available as a series of hardness ranging from 55A to 95A. This range is also available as both two-part and three-part systems.

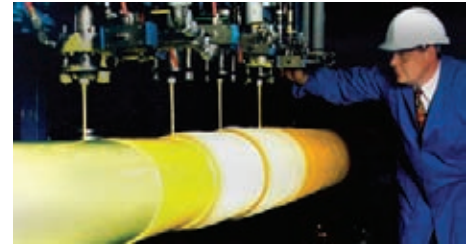
A range of sub-sea insulation systems is available for use down to 3 kilometers. For relatively shallow water applications, polymer spheres are used in a high-performance syntactic polyurethane with an overall density of 700 kg/m³. The thermal conductivity of these products is 0.12 W/mK, an improvement of almost 40% over non-syntactic grades. Products within this range are available as moulding grades or as liquid-pouring materials using a controlled rotational casting technique. Deep-water syntactics utilise glass spheres as the insulating medium, the specific grade being dependent on the water depth to be encountered.

IFS has a variety of products suitable for pipeline field joints, with densities ranging from 160 to 2000 kg/m³. Several grades can be used at water depths of greater than 3 kilometers and provide a typical thermal conductivity of 0.195 W/mK. The gel time of these systems can be varied as required by the specific requirements of the proposed project.

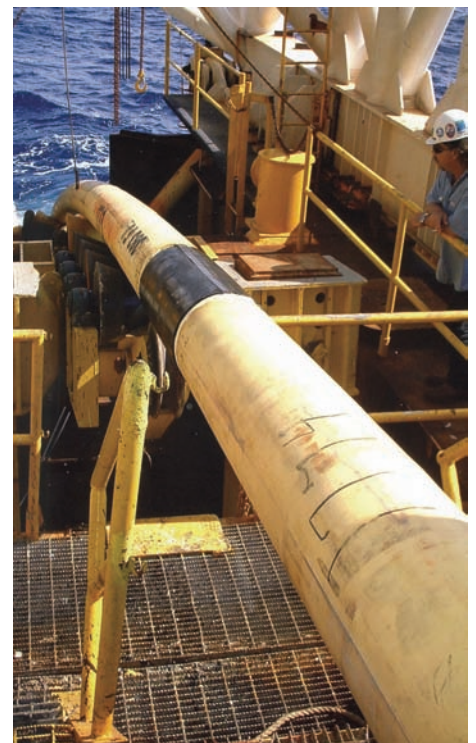
Specialised formulations are available for applications that require specific mechanical and thermal properties. For example, high tensile, high abrasion-resistance products for manufacturing pipeline bend-stiffeners are available in a variety of colours. Similarly, elastomers with controlled modulus properties have been developed for bend-restrictor applications. TbT-free elastomers with high antifouling properties are also on the range.

Spray-applied elastomers with superior mechanical properties are available for a variety of applications. These can be tailored to produce a tough protective layer at various hardness, colour and reactivity grades. Polyurea spray coatings are also available for waterproofing applications.

Clearly, IFS has a broad range of products with proven performance over many years in harsh climates. Detailed Technical Datasheets can be obtained from the Company.



*tried and tested
products for use in
harsh environments*



Envirofoam Chemicals Ltd



As a subsidiary company of IFS Chemicals, Envirofoam Chemicals Ltd specialises in the development and sales of plant and chemical systems for promoting environmentally attractive polyurethane technology. Long before the recent interest in the environmental effects of certain chemicals on the ozone layer and on global warming issues, IFS developed polyurethane chemical systems that provided more environmentally attractive alternatives.

As far back as 1983, the Company developed and supplied the very first insulation foam based on polyols derived from sunflower oil. The Tuticorin pipeline project in India consisted of an 11 kilometre, above-ground line which was insulated in two-metre sections. The pipe diameters were 150mm and 400mm, the insulation being 50mm thick with a U-value of $0.4W/m^2K$. This successful installation led the way in the development of industrial chemicals from natural, renewable, sources of oil.

An important advantage of using natural oil-based polyols is that they can be manufactured close to the local market and immediately included in the fully formulated systems. In countries where transportation is difficult to achieve, it may prove fruitful to erect a polyol plant to cater for the local market rather than importing polyols via tortuous supply routes.

Envirofoam Chemicals Ltd can offer a complete plant for the conversion of oils to polyols as well as full formulation know-how developed over many years in the USA and UK. The formulated products have been developed in close cooperation with existing successful manufacturing companies (as detailed in a paper entitled 'Low Cost Polyols From Natural Oils' given at the Utech conference in Singapore).

*manufactured close
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The global interest in this development was so significant that a separate subsidiary Company was established in order to specialize in the further development and exploitation of environmentally improved polyurethanes. Plants were manufactured and supplied to various parts of the world, including Asia and South America. Today, these Companies continue to produce polyurethane chemicals from locally available vegetable oils.

When the CFC/ozone layer issue arose in the mid '80s, IFS and Envirofoam Chemicals spearheaded the development of polyurethane blowing agents having no adverse effect on the ozone layer. Whilst the rest of the industry was debating which of two HCFCs would be used for future insulation foams, we had already by-passed this approach and introduced a blend of zero ODP blowing agents which could be used for all insulation applications. This concept was described by the Daily Telegraph as *"a breakthrough.....in the invention of an insulation material which does not use so-called CFCs and which can be used in refrigerators"*.

Since that time, the Company has gone on to develop and implement further improvements in the area of environmental science. Efficient insulation foams containing blowing agents with very low Global Warming Potentials were commercially introduced in 1998, well ahead of the competition. Elastomer systems which cured and processed well without the incorporation of mercury-based catalysts were also first developed and introduced to the market by ourselves.



Innovation

IFS has always been regarded as an innovative company, generally well ahead of its competitors in finding workable solutions to a variety of problems. IFS has been at the forefront of new developments including superior fire performance, the use of more environmentally acceptable chemicals and the development of high performance chemicals based on polyester technology.

Apart from the very significant environmental contributions made by IFS, principally in the areas of improved blowing agent technology, enhanced anti-fouling materials and chemicals from renewable sources, many other technical advances have been made. The principal activity of the Company is to formulate polyurethane chemicals for very specific and sometimes challenging applications. Some of these are described in our newsletter, *IFSpotlight*. Examples include a pipeline protection system for overland pipes in areas of seismic activity and products with improved resistance to high temperatures. A particularly significant development was the four-layer externally-applied insulation system for sub-sea pipelines. This unique system was successfully applied to a Shell oil pipeline in the North Sea using a controlled rotational casting technique. Since then IFS has gone on to develop a complete range of improved products for this and many other industries.



Technical Assistance

As part of the service provided by IFS to its customers, technical service assistance needs to be both fast and efficient. The Company has placed a great deal of emphasis on giving effective assistance in all areas of polyurethane technology. In addition to the laboratory staff and other experienced personnel at King's Lynn, we have highly regarded technical service managers covering the UK.

One of the prime responsibilities of the technical service managers is to arrange and carry out acceptance trials at customer's premises. They are adept at setting up the dispensing equipment, ensuring that all production parameters are adequate and then running the chemical system in the correct manner.

The technical service managers act as a vital link between the customer and the King's Lynn office, ensuring that all customers concerns are dealt with and overseeing any modifications to formulations prior to implementation.

They also provide the facility to test for various gases which may be of concern to local Health & Safety inspectors. These include MDI, pentane and methylene chloride. They are able to offer advice on how to reduce atmospheric levels of these substances in the workplace before such considerations become a problem with local authorities.

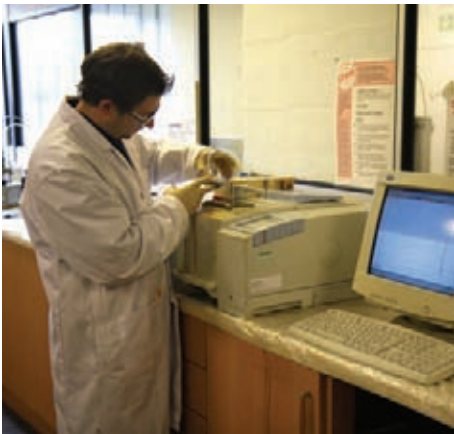
*effective assistance in
all areas of polyurethane
technology*



Quality



IFS runs a formal quality system and has gained approval to ISO9001



IFS has always been dedicated to the production of high quality chemicals with very good batch to batch consistency.

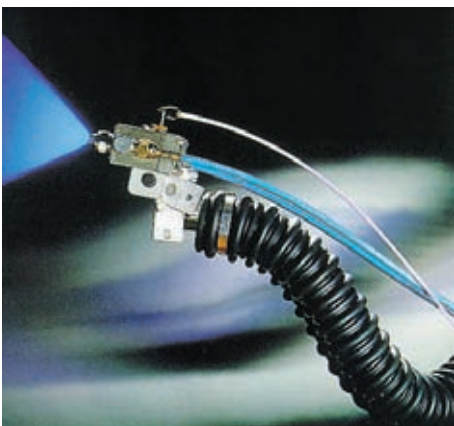
Fully traceable records are kept, incorporating supplier records, in-process materials and finished goods inventory. Samples of every batch of chemicals are kept for future reference and all aspects of the quality system are regularly reviewed in accordance with normal industrial practice.

IFS runs a formal quality system and has gained approval to ISO9001. A design element has been included within the scope of the registration to include the significant contribution and importance of new development products. The certificate of registration, issued by BSI, is number FM33811.

A full time Quality Manager is employed to administer the system, ensuring it's continued improvement and adapting it to incorporate other, non-quality related procedures.

A great deal of emphasis has been placed on subjecting every batch of chemicals to the most rigorous series of tests in order to ensure that the customer is totally happy with the quality of the chemicals supplied. Infra-red fingerprint tests are standard procedures as well as analytical/foam performance tests. In some cases moulded foam items are subjected to detailed testing prior to quality approval for each batch.

Safety



The IFS Group of companies has an ongoing responsibility to its workforce and customers to provide full information on the safety aspects of using polyurethane chemicals and processes. Full COSHH assessments are carried out on all chemicals used by the Company and Safety Data Sheets are issued for all formulated blends and isocyanates supplied by the various Group companies.

In a similar format to the Quality Manual, the Safety Manual contains a number of Safety Procedures, with responsibility designations, which are reviewed regularly. These procedures cover such topics as fire evacuation, reporting of incidents, risk assessment, provisions of safety equipment and safety training.

Premises

IFS is situated in the village of Roydon, close to King's Lynn, Norfolk.

The factory consists of seven interconnecting industrial units totalling almost 60,000 sq. ft. All stocks of raw materials and finished goods are stored inside the factory in metal drums and bulk storage tanks (ranging from 10 to 35 tonnes each).

The factory has 7200 sq. ft. of office and laboratory space with a well equipped development area.



Complete Development Service

IFS is able to offer a complete in-house development service with laboratory and an on-site machinery hall equipped with low and high pressure dispensing equipment producing sample components for customer evaluation.

By optimising formulations prior to introduction at the customer site and commissioning, IFS minimises any potential disruption to ongoing production processes.



Contacts

The Group has three Directors, each being responsible for a specific area of company activity:



Managing Director: Dr Barrie G Colvin

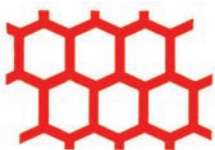
Responsible for the overall performance of the company, ensuring that the Company conforms to all legislative requirements with regard to employment law, health and safety, environmental issues etc. Barrie assists in all Technical Development projects and continually reviews all technical and quality considerations.

Technical Sales Director: Mr Ian J Widdowson

Responsible for the development of sales (except for ECL) and co-ordinating technical service visits.

Financial Director: Mrs Diwy Colvin

Company Secretary, responsible for office administration including personnel issues, accounts etc.



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